

SCIENCE.

FRIDAY, NOVEMBER 6, 1885.

COMMENT AND CRITICISM.

THE SCHOOL OF INSTRUCTION of the signal service at Fort Myer has been the scene of occurrences which show in a strong light the incongruity of having the weather service under military control. Some years since, General Hazen made known his desire to have educated young men, especially college graduates, enter the signal service as privates; and, under the promise of good treatment, he seems to have been quite successful in recruiting his corps from this class. The recruits are, however, required to learn the drill and duties of the common soldier. In this branch of their education, the class now under instruction proved so inapt that the drill-officer lost his patience and his temper, and expressed his sentiments in language unfit for ears more polite than those of the mules on the plains. The aggrieved young men wrote a letter of complaint to the chief signal officer, and for this offence they were promptly brought before a court-martial. The trial has been concluded, but the result has not yet been made known.

The case is instructive as showing the wide divergence between military discipline and common sense. While the young men were tried by court-martial, the officer whose ungentlemanly conduct caused the trouble was let off by what General Hazen is pleased to call a reprimand, but which was nothing more than a letter calling his attention to a certain paragraph in the army regulations. We can hardly suppose that this letter would seriously disturb the equanimity of an officer of the breeding indicated by the language of the offending lieutenant. Common sense would have dictated the trial of the officer by court-martial, and the reprimand of the men whose offence, as General Hazen himself says, was only that of going about a right act in a wrong way. We may admit that the chief signal officer knows best how so purely technical an offence against military discipline should be dealt with in army practice; but this only emphasizes the deviation of that practice from common sense when applied to a civil service like that of the weather bureau.

IN THE ANNUAL REPORT of the chief signal officer, just issued, it is claimed that meteorological work depends upon an accurate and continuous record, and that to get these conditions the observers must be held with an absolute control, which makes a military organization indispensable. It is further stated that the gathering of these observations is traditionally military work, and that "all that is of much value has been done under some form of military organization." While not wishing to disparage the faithfulness of the meteorological records of our own army surgeons, which are referred to as among the earliest, we think it must be acknowledged that the aimless records of temperature and barometric pressure of the past were made by those having much spare time upon their hands, whether surgeons at army posts or civilians. But meteorology is not a mere question of gathering records of observations. These records must be discussed, and the truths hidden in these masses of figures must be revealed, before any true science exists. We find that this need is recognized by the Army signal service, and that Professors Ferrel, Abbe, Trowbridge, Rowland, Pickering, Mendenhall, Wright, not to mention other younger men, and all civilians, have been employed as a 'study division' to improve the methods of taking observations and the instruments used, to prepare text-books on meteorology and meteorological instruments for the use of the service; in fact, to direct the whole work of the bureau. We do not forget the officers of the army who have done good work for the service and for science, but merely wish to call attention once more to the fact that the proportion of men fitted to conduct scientific work is small, and no larger among army officers than among civilians. There is, moreover, no evident connection between predicting the coming of a killing frost which will destroy the last of a growing cotton crop, a matter treated of in the latter part of the report, and skill in laying a field telegraph line, military signalling or drill, to which are devoted the opening pages. It is inevitable that the larger portion of the leaders of the service must be civilians. The work of the service is done for the benefit of commerce and agriculture, and it is in-

congruous that it should be in the hands of army officers.

WE NOTICE WITH MUCH PLEASURE the election of Prof. E. S. Holden to be president of the university of California, and director of the Lick observatory. Professor Holden's resignation as director of the Washburn observatory at Madison, Wis., takes effect on the 1st of January next. His appointment as director of the Lick observatory will hardly be a matter of surprise to those who are aware that, as consulting astronomer, he has virtually had the direction of the work as it has progressed, visiting the site on Mount Hamilton in 1881, and again in 1883 and 1884. Very happily the choice both of the Lick trustees and of the regents of the university has fallen upon Professor Holden. It is understood that in his letter of resignation to the regents of the university of Wisconsin, he strongly urges the name of Prof. W. A. Rogers, of Harvard college observatory, as his successor.

THE CREATION OF A NEW CHAIR of psychology at the Sorbonne, and the instalment therein of M. Th. Ribot, editor of the *Revue philosophique*, as professor, marks a new epoch in the relation of the university to philosophy in France, and is a most gratifying proof of the way in which the world moves. Safe opinions and literary smoothness have, for almost as long as any one now can remember, been stronger passports to French philosophic professorships than either learning or originality. But the renewal of the science of human nature by the physiologists, pathologists, and evolutionary anthropologists of this day and generation, has brought too great a mass of new facts with it, and of new conjectures, for any barriers to stand. They must be let in somehow, and officially taught and discussed, if the official teaching is not to appear ignorant and antiquated. The Ministry of public instruction has wisely seen this, and has had the sagacity to choose for the new professor the man who has done most to introduce the new ideas to his countrymen. M. Ribot's place at the head of the *Revue philosophique* is, to be sure, more important than any professorship; and a professorship would be but a faint reward for the service he has done to French philosophy by his admirable management of that periodical. But the two functions do not exclude each other, and we wish M. Ribot health and strength for a long career in both.

THERE IS NO GEOGRAPHER, biologist, or ethnologist, probably no statesman, on the other side of the Atlantic, to whom the name of Justus Perthes is not full of meaning. It is not merely that the house has helped, by its publications, each in his profession. It is not only because, of all geographical chart-work, theirs is pre-eminently the most delicate, the most reliable, the most artistic in the taste with which colors are used. It is rather because to the operations of a firm of means, business ability, and pride in furthering geographical science, have been added the efforts of a succession of geographers who stood second to none in their specialties, and whose ambition was not merely pecuniary or personal. The founder of this house, Johann Georg Justus Perthes, was the son of the physician to the Prince of Rudolstadt, and was born September 11, 1749. He engaged in a commercial enterprise, out of which, in September, 1785, the establishment at Gotha originated. Since then, after the death of the founder, the business has been carried on by Wilhelm (1816-1853), Bernhardt (1853-1857), and by Adolf Muller and Rudolf Besser, on behalf of a posthumous son of Bernhardt Perthes and others interested, nearly to the present time. In September last the centenary of the establishment was celebrated, and a jubilee-volume, elegantly printed, and illustrated with portraits of the firm and its chief collaborators, has been distributed to its associates and friends. This volume contains a brief history of the firm, of its connection with geographical literature, with geographers, and with explorers. The part it has played in these matters redounds to the honor of all concerned. A table showing the present organization is appended. It is unnecessary to go into details with which most of our readers are more or less familiar already. It is sufficient to say that a house to which we owe the works of Berghaus, Stieler, Petermann, Spruner, Behm, and their associates, must be counted among the ornaments of the German fatherland and the efficient forces of civilization.

PASTEUR AND HYDROPHOBIA.

THE recent communication of M. Pasteur to the Academy of sciences, upon the prevention of hydrophobia by inoculation, has naturally aroused great interest among the general public as well as in the scientific world. The methods and results of his experiments upon this subject have not yet been published with sufficient detail to justify any

positive judgment or intelligent criticism concerning them. If correctly reported, Pasteur is convinced that he has discovered means by which the virus of hydrophobia can be attenuated, and that, by the inoculation of the attenuated virus, individuals may be rendered, for the time being, insusceptible to the disease. The attenuation is said to be effected by preserving for a variable length of time pieces of the spinal cord of rabbits which have been inoculated with the hydrophobic virus. The longer the pieces of spinal cord are preserved, the weaker becomes the virus contained in them. It is evident that the spinal cord must be preserved in a manner not to decompose, and at the same time not to destroy at once, the hydrophobic virus. We are not informed how these ends are accomplished, but in accordance with Pasteur's doctrine of attenuation of virus, they must be reached without any obstacle to the free access of oxygen to the specimen. Of especial interest is the statement that inoculation with attenuated virus will prevent the outbreak of the disease, even when this inoculation is performed after the reception into the body of the strong virus by the bite of a rabid animal. There is no information as to whether this inoculation is effectual after the development of the symptoms of hydrophobia or not.

The conclusions of Pasteur, coming from so great an authority, will receive, as they deserve, respectful and serious consideration. It is understood that for no less than five years Pasteur has given the greater share of his time and labor to the study of hydrophobia. It is probable that his conclusions are based upon a large number of careful experiments upon animals. The two or three reported instances of preventive inoculation of human beings, which have excited such popular interest, and which have been reported with so much dramatic detail in the newspapers, can hardly lay claim to much scientific value in proof of Pasteur's views. Even if the number of reported cases were much larger, it would be necessary to use great caution in drawing from them positive conclusions, in view of the facts that the period of incubation of hydrophobia is very variable, and sometimes of many months' duration; that a considerable number of those bitten by rabid dogs never contract hydrophobia, even when no especial treatment has been adopted; and that there is great popular ignorance as to the symptoms and means of recognition of hydrophobia in dogs.

There is no evidence that the real nature of the hydrophobic virus has been discovered; indeed, we have, in June of the present year, the positive statement of Bouley, who is believed to be familiar with Pasteur's work, that no organism has been isolated or cultivated which can be considered to be the virus of hydrophobia, and that Pasteur's researches have been conducted without a knowledge of the biological properties of the suspected organism. The whole subject of immunity from disease by preventive inoculation is in a very unsettled state. We possess a mass of superficial observations and undigested conclusions on the subject, but we have very few positive and well-established facts. It is to be hoped that Pasteur's researches upon the inoculation and cure of hydrophobia will be found, when they are fully published, to add greatly to our knowledge of this subject, and that the blessings which are anticipated from his discovery may be realized.

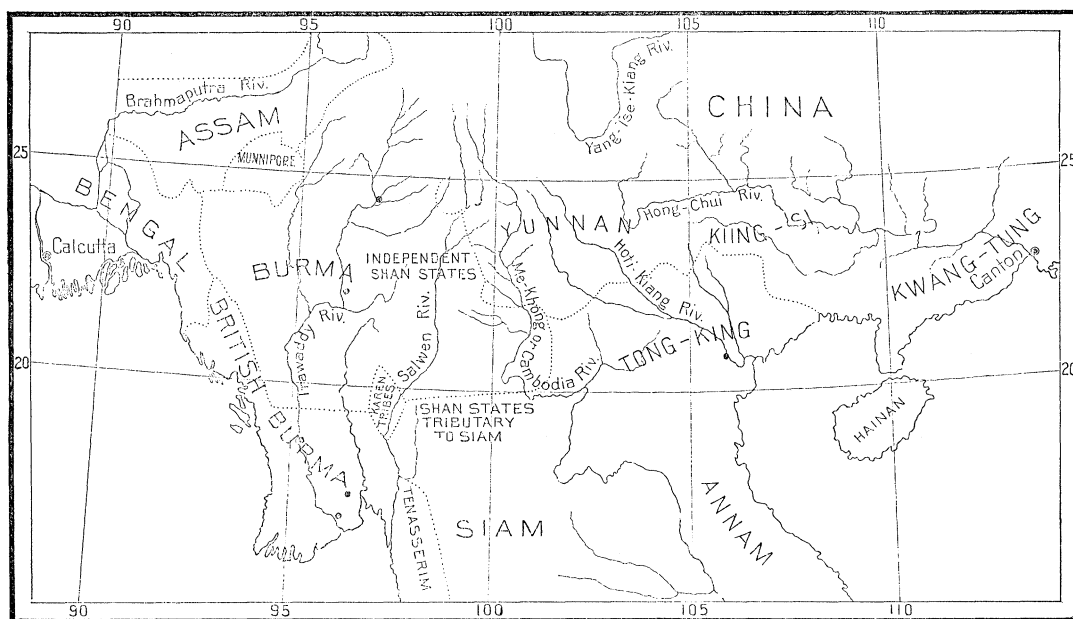
THE BURMAN DISPUTE.

THE Bombay-Burma company, a British corporation having very important interests in Independent Burma, was ordered by the Burman government to pay twenty lacs of rupees (about \$1,000,000) in respect of their forest leases. The company replied that it was unable to pay such an enormous sum, and, furthermore, that no such payment was required under any reasonable construction of the grants from the Burman king. Judgment was accordingly entered against it. The company appealed to the British government, and on the twenty-eighth of last August 'the officiating secretary to the chief commissioner of British Burma' wrote to the Burman minister for foreign affairs, reciting the facts as they are here given. He then proceeded to inform the Burman minister that the British government—not the chief commissioner, not the Indian Viceroy, but the British government—'cannot acquiesce' in any such proceedings. He asked that all further actions against the company should be suspended, and proposed that the whole dispute should be referred to a person skilled in judicial matters, to be appointed by the Viceroy of India. He closed by requesting the Burman government to 'make a very early reply' to these three questions: (1) whether the decree would be suspended; (2) whether the matter would be submitted to arbitration; and (3) whether the Burman government would agree to abide by the arbitrator's decision.

To an unbiassed observer this proposition that the government of one of the parties to a dispute

should appoint an 'arbitrator' to whose decision the other party—in this instance an independent sovereign, so far as the British are concerned—should agree to abide, even before knowing the arbitrator's name, seems to possess features as objectionable as they are novel. The Burman government did not take kindly to the idea of exposing all the secrets of Burman mal-administration to the gaze of a foreigner, even though he possessed the confidence of the Viceroy of India. A reply was accordingly drawn up, and sent to Rangoon in the most insulting way that could be devised. One sentence will show the weight which the despot of Mandalay attached to the demands of the British government. "The chief commis-

person sent by the chief commissioner of British Burma shall be received with all honor; (2) that all proceedings against the Bombay-Burma company shall be suspended, pending his investigation; (3) that a British resident with a sufficient guard shall be accepted. If the first two demands are not conceded before a certain day, 'action will be immediately taken.' In other words, if the monarch of Burma will not submit peaceably to demands which were just in the eyes of Lord Dufferin, he will be compelled to submit to them and to become a vassal of the Empress of India. There are two sides to every question, and in the present case it must be admitted that, from a Burman point of view, Theebaw, the Lord of the White



sioner is distinctly informed," so this strange letter reads, "that on no account will there be any suspension of any order or action which it may be necessary to pass or take against the Bombay-Burma company pursuant to the judgment of the shildaw on the timber case." If the affair did not involve the lives of thousands of innocent Burmans, and also, as will presently appear, the continued trade supremacy of the English in the east, this reply of the ruler of less than four million partially-civilized and poorly-armed persons to an official letter of a servant of the Empress of India would appear simply ridiculous.

The matter was placed in the hands of Lord Dufferin, the present viceroy; and after some delay an ultimatum was sent to King Theebaw. In it three demands are made: namely, (1) that a

Elephant, is acting entirely within his legal rights in confiscating to his own use any thing upon which he can lay his hands. It is hardly to be expected that the English would view the matter in the same light; and it should always be borne in mind that, as a late viceroy once said, when the English are attacked in their mercantile interests, they are wounded in their most irritable point; and the present issue involves not merely the ruin of a particular commercial corporation. It is a part of the contest for supremacy in the east, which began years ago, in 1746, when the French captured Madras, and of which the end is not yet.

The first thing that strikes the eye when directed upon a map of Indo-China is the fact that all the great rivers of this region—the Hong-Chui (Long River or River of Canton), the Hoti-Kiang (Son

Tai or Red River of Tong King), the Me-Khong or Great River of Cambodia, the Salwen, and the Irawaddy, all have their sources, with the possible exception of the Canton River, in the unknown mountain regions of southern Tibet. Another noticeable feature is a spur of the Tibetan ranges, which, extending southwards between the valleys of the Bramaputra and Irawaddy, completely interrupts direct overland communication between British India and the north-western provinces of China. Another important fact is that throughout this whole region, excepting, of course, the great deltas of the Irawaddy and Me-Khong, the river valleys are very narrow, the remainder of the country being little else than a confused mass of hills.

There is no regular overland communication between the interior and the seaboard over which bulky goods can be transported with any fair chance of profit. The rivers must be utilized to the greatest possible extent, and it is a singular fact, but a fact nevertheless, that only one of these five great rivers is capable of being navigated with profit by steamers of a suitable size. The Canton River abounds in rapids and difficult navigation, and at the end of his tedious boat journey the trader is still far from the coveted tea mart of Puerh in southern Yunnan,—a mart at which the best tea grown in China, the so-called Puerh tea, is distributed. The Son Tai, or Red River of Tong King, at first seemed to offer a solution of the problem; but on further investigation it has proved to be filled with rapids, and to run through a wild and savage country sparsely inhabited by hostile tribes; and, as every one knows, the French have found, at the cost of much blood and treasure, that Yunnan and Kwang-Si are as far off as ever. The Me-Khong, owing to its length alone, is obviously out of the question, while the Salwen is navigable for less than one hundred miles. The last river on the list is the great Irawaddy, which, rising in the unexplored fastnesses of Tibet, flows in a general southern direction, by Bamo (at the head of navigation), by Mandalay (the present capital of upper Burma, and incorrectly spelled Mandalay in our map), by Prome (at the end of the only piece of railway in either Burma), and by Rangoon (the capital of the British Province of Burma, and the seaport of the Irawaddy. Strictly speaking, Rangoon is on the Rangoon River; but as the whole country between Cape Negrais and the Salwen is one vast alluvial plain, in which the Irawaddy, Rangoon, Pegu, and Sittang intermingle in the most reckless confusion, it is not improper to speak of Rangoon as situated on the Irawaddy, with which it is in direct communication by a delta branch of this great river. Eight hundred and

forty miles above the sea, Bamo (pronounced Bamaw) stands at the head of navigation, and only fifty miles away in a straight line is the Chinese frontier. The Irawaddy is thus the key to the trade of this part of the world, and the valley of the upper Irawaddy is Independent Burma. Can we wonder, then, that the English nation welcomes the excuse which the recent suicidal action of the Burman government has given it for taking possession of what will undoubtedly prove to be one of the most important trade routes of the world.

It may be said that I have overstated the desires of the English in this matter, and, to guard against any such reproach, a few sentences culled from the leading editorials of the London *Times* for October 15 and 17 are here introduced. The first is from the issue of the latter date, and is as follows: "It is as a high road to China that upper Burma is most valuable to us, and this road we shall now insist on keeping open, at any cost." The other quotation is somewhat longer, but is still more to the point: "Upper Burma is a strip of country interposed in the direct line between the eastern provinces of India and China. It is most important for our trading interest that the route between the two empires should be open. The establishment of another European influence [French?] in upper Burma could be regarded by the English only with dismay. But with the trade routes in English hands would come, not only trade, but, in time, not an alliance, but a friendly understanding between England and China,—two countries whose interests are identical, and whose enemies [Russia and France?] are the same." At first sight it may seem strange that such a valuable trade route should have remained unknown and closed to Europeans for so many years, and should have almost ceased to be used as a trade route within the past two decades. Yet such is the fact, though the causes of this strange development are not far to seek, and are to be found in the character of the races which inhabit upper Burma and south-western China.

With the exception of the regions surrounding the poles and a small portion of central Africa, there is probably no part of the earth's surface about which geographers are so ignorant as they are of the topography, hydrography, and ethnography of this part of Indo-China lying between the twentieth degree of north latitude and the sources of the Bramaputra and Yang-Tse-Kiang. It is known, however, that three routes lead from Bamo to Yunnan, and they have been traversed repeatedly in the last few years by Europeans, and will be found described in the books.

The Burmans are the ruling race of Burma, and, if we had space, would receive more than a passing

notice. As it is, however, we can only point out, that, separated as they are by lofty mountains, the Indians and Burmans have little in common; but the Buddhist religion, and the Buddhism of Burma, are said to differ in many essential points from that of India. Then, too, the caste distinctions of the one country do not obtain in the other, and, finally, the system of land tenure and administration in vogue in this part of the land of the white elephant, is unique in the institutional history of mankind. Any one interested in the subject is referred to a work in two volumes, entitled 'The Burman,' by an author who conceals his identity under the euphonious pseudonyme of Shway Yoe, and to the late Captain Forbes's invaluable work on British Burma.

If the Burmans are the rulers of the country as a whole, their hold on the tribes living between Bamo and the Yunnan frontier is very slight. On the hills nearest Bamo live the Kakhyens, a savage and godless people, who worship 'nats' and tyrannize over travellers. They are few in numbers, and, with the English once in possession of Bamo, could offer little opposition. Intermingled with them in Siam, and spreading thence to the south well into Siam, and to the east beyond the Chinese frontier, live the Shans, who are much more capable of civilization than the wild Kakhyens, and even now lead a peaceable and well-ordered life. The Shans seem to be related to the Siamese rather than to the Burmans, and, indeed, the southern tribes are tributary to Siam. So, too, in theory, are the Burman Shans tributary to Burma. In practice, however, it is not so, and the power of the Burman government, which grows rapidly less as one gets away from the despot's palace in the centre of Mandalay, becomes nothing long before the Yunnan frontier is reached. Indeed, some Shan tribes are reported as paying a nominal tribute to the rulers of both countries, while obeying neither.

Passing over the boundary, we come at once to that portion of Yunnan which for eighteen long years was the scene of the Mohammedan revolt against the Chinese yoke. At last, in 1874, this rebellion of the Panthays, as the Mussulmans are called in Yunnan, was finally crushed. In the course of the eighteen years of civil war, however, the country had been in great measure depopulated, its agriculture ruined, and its commerce paralyzed. Now, again, caravans are reported as arriving at Bamo. This part of our globe is so rich in the products of its soil, in the mineral wealth lying within easy reach, provided the cost of transportation was not so great, and in its splendid forests of teak and other hardwood trees, that there seems no doubt but that

the first nation to penetrate to the interior, and build the necessary roads and railways, will for many years monopolize the trade of a large portion of Farther India. EDWARD CHANNING.

ÆSTIVATION OF MAMMALS, WHAT IS IT?

THE occurrence of æstivation, or something considerably like it, is a possible mid-summer feature of the animal life in southern New Jersey; and yet I find no reference to the subject in any work descriptive of the habits of our fauna. What is æstivation? In Stormonth's dictionary, the definition is as follows: the sleep or dormancy of animals during the hot or dry season in warm climates; the analogue of hibernation in cold regions.

The condition of certain mammals, as reported to me during the summer of 1884, brought the subject prominently to mind, and I found that in past years I had made many memoranda concerning unconscious animals; but the full significance of which I did not, until recently, recognize; and indeed, I may not now correctly interpret the facts.

The following is an instance of the supposed occurrence of æstivation, or something closely akin to it:—

A family of white-footed mice was found in an exposed position in an open field; the nest being made of a few leaves and some thistle down, under an old tin pan, the bottom of which had nearly rusted away. When these mice were taken up—and they were handled with great care—they were found to be soft and warm, as when in full vigor, but gave no signs of life. The female mouse and her three young, which were more than half grown, constituted the family. As there was no apparent cause for the death of the mice, I determined to investigate the matter very carefully. One of the young was pricked on the ear with a needle, when it flinched slightly. The others were similarly tested, and all gave evidence of life to the same extent. Carrying these mice to a shady spot, and placing them in a comparatively cool position, they regained their ordinary activity in about seven hours; the process not appearing to be as gradual as it really was, but resembling closely the awaking from an ordinary sleep. They were then replaced in their nest in the field, which they promptly abandoned, but returned thereto, in the course of the next day. Three days later, these mice were found in precisely the same condition. Time, noon; thermometer 106° F. These mice were taken directly to a cellar, forty-two degrees cooler than the open field, and the sudden change proved too great a shock. The young died in one

hour; the old mouse, in less than three hours. Had these mice, after their first removal, when replaced in the field, directly become stupid or actually dormant, it might naturally be inferred that the heat had seriously affected them; but, as we have seen, such was not the case. During the evening of the day following my replacing them in the field, the air became cooler by twenty-nine degrees, by 7 P. M., and was thirty-four degrees cooler four hours later; and the mice were active and fed heartily upon bread crumbs placed near their nest. Now, why, it may be asked, did they not seek out a cooler retreat in the woods near by? I can only suggest that the supposed aestivating condition was not inconvenient or unpleasant, and that it was preferable to the abandonment of their nest, which was suited to their needs for all time, except such extraordinary spells of hot weather. Either these mice were excessively stupid, or a dormant condition, caused by excessive heat, was nothing unusual with them.

There is, in this instance, a marked difference from a hibernating sleep, in that the period of dormancy was of but a few hours duration; but was like the torpid slumber of a hibernating animal, in that the condition was one from which it was not possible to arouse them, as from ordinary slumber. The awakening had to come from a change of temperature, and just in proportion as the evenings were warm, the mice were tardy in returning to consciousness. To more effectually test this, I carefully removed these mice from the field, and placed them near a stove, so that the midday temperature could be maintained. The result was the continuance of the dormant condition for eighty-four hours.

When the effect of a protracted drought and heated terms upon our animals has been more fully worked out, I believe it will be found that many a mouse and other small mammal which is found lying dead as supposed, is really not in a moribund but dormant condition, and if left undisturbed, would revive. But what other evidence is there of this? The white-footed mice are not, of themselves, sufficient to prove that aestivation is an established habit. What other evidence among mammals have we?

In August, 1880, I found bats on four different occasions, all of which were apparently in full health, yet they did not, for some reason, which I supposed to be excessive heat then prevailing, resume, at sundown, their crepuscular flights at the usual hour. These bats had 'gone to roost' under leaves on trees and a grape-vine, and were, no doubt, fully intending to resume their activity after the nap of a day's length was over. Why did they not? The following days were excessively

hot, until the fourth, which was a few degrees cooler. It clouded over early in the afternoon; soon it became damp, and just before the commencement of a passing shower, these bats were stirring a little, as they hung. Quivering their wings, as though to see if all was in working order, and then, away they flew, after, in each case, nearly ninety hours of rest. Does it adequately explain all the facts to say that these bats were overcome by the heat? They were resting in the shade during the whole day, and the nights, when they would be active, were cooler; but in these cases, very little cooler. They were nights to be remembered for their sultriness, and may it not be, that there was not sufficient difference in the midday and evening temperature to enable them to throw off the nervous prostration caused by the heat of the day? Explain it thus, and then we are left to consider what is this nervous prostration? In the case of the bats mentioned, they were all in a perfectly torpid state, and gave not the least sign of life when handled; and only flinched slightly, when wounded by being pricked with a needle. Would not nervous prostration that produced insensibility, lasting several hours, almost certainly produce death? In the case of the bats, a torpid condition of ninety hours produced no ill effects. I am disposed to believe that the coming hot and dry weather was anticipated, and these bats retired for the purpose of escaping it, and entered into a condition widely different from ordinary sleep, which was to last until the so-called heated term was over, the lowering of the temperature being the one means through which they would be restored to consciousness. There occurs this deliberate action on the part of certain mammals, which regularly hibernate—why should not the same be true of them when the extreme is one of heat, instead of cold?

As bearing upon this question, let me quote a few lines from the *Encyclopedia Britannica*—ninth edition—article, Hibernation. It says: "The dormouse not only hibernates in the strict sense of the term, but will sleep at intervals for several days together, during mild weather. When a *Myoxus*, an allied animal inhabiting Africa, was brought to Europe, it hibernated as if this were its normal habit. Whether it aestivates in its native country is not known, but its hibernating in Europe shows a greater power of adapting itself to changed conditions of life than we should have been inclined to suspect."

I would briefly call attention to two points in the above: that in temperate climates prolonged sleep is not unknown among rodents; and also, that some tropical rodents probably aestivate. In the case of the white-footed mice, and, too, of the

bats, I am very positive that their condition was not that of ordinary slumber, and the tropical temperature, at the time, even through the night, certainly suggests æstivation as the most plausible explanation of the phenomena I have described.

C. C. ABBOTT.

THE LIFE OF GEN. EMORY UPTON.

GENERAL EMORY UPTON, at the time of his early death in 1881, was probably the most accomplished officer in the United States army. He had a genius for the science of military tactics, and, as a thinker and writer upon this subject, has left a name of enduring renown. General Michie, the well-known professor of physics at West Point, aided by General James H. Wilson, who was distinguished in the cavalry service during the civil war, has recently published an extended memoir of Upton, tracing the various steps of his advancement through boyhood, with his strong desire to go to West Point; through his cadet life, in which he won high rank; through his varied and arduous experience in the three branches of army service during the war, winning success in each; through his career as the commandant of cadets, as an instructor in artillery at Fortress Monroe, as an official observer and student of the armies of Europe and Asia, and especially as an authority on military principles and practice. General Wilson says of Upton, that he was "as good an artillery officer as could be found in any country, the equal of any cavalry commander of his day, and, all things considered, the best commander of a division of infantry in either the union or rebel army." This is high praise, but the volume by General Michie shows how such success was won, and leads us to believe that Upton's name, as years roll by, will be honored more and more as one of the greatest tacticians of modern times. His personal character was as remarkable as his professional. Like Havelock, Stonewall Jackson, Chinese Gordon, and many other heroes, he developed a religious life of the purest and most lofty type. Toward the end of his life he was engaged upon a study of the military policy of the United States during the revolution, and from that time down to the year 1862, when his manuscript ends. In this work he was associated with his classmate at West Point, Col. H. A. Du Pont, by whom the task will doubtless be completed. From the outline given by General Michie, it is clear that the treatise will be of the greatest value, not to military men only, but

to all students of history, and especially to statesmen. It will throw a great deal of light on the causes of success and of failure in the various campaigns which have taxed the resources of our countrymen. The publication of this manuscript is greatly to be desired.

As a soldier and as a writer, Upton may be described as one who applied the principles of scientific method to the organization and management of armies. His aim was lofty; his success was great.

DOOLITTLE'S PRACTICAL ASTRONOMY.

PROFESSOR DOOLITTLE has given us an excellent manual, either for the student or for the worker in the field. Intended only for field astronomy and navigation, we find no treatment of observational methods with large instruments, but its own field is thoroughly covered. "The author has not sought after originality, but has attempted to present in a systematic form the most approved methods in actual use at the present time." It is a comfort to turn the pages and find standard formulæ in a familiar dress. Much of the 'originality' of many modern text-books consists in rigging out old accepted formulæ in a new alphabetical suit, so that no one can be quite sure he is using just the right one without constant reference to the great 'original.'

We can only give an outline of the contents. The introduction develops in a simple but thorough manner the method of least-squares and the subject of interpolation. The different systems of spherical co-ordinates, the formulæ for their transformation and for parallax, refraction, etc., are very completely developed. Under the subject of angular measurements, verniers, micrometer-microscopes, graduated circles and their sources of error, chronometers, clocks, and chronographs are fully described and investigated. With the treatment of the adjustments and errors of the sextant, is introduced an example of the determination of the eccentricity by star observations, from the work of Professor Boss on the northern boundary survey; and chapter v. develops thoroughly the best methods of determining time and latitude by the sextant or any altitude instrument. The transit-instrument in its various forms, both in the meridian and prime-vertical, is very fully treated; likewise the determination of longitude by chronometers, by telegraph, by lunar distances, by moon-culminations, and by occultations of stars. Of course, the zenith-telescope claims its due share of attention, and an unusually complete chapter

Life and letters of Emory Upton, Brvt. Maj.-Gen. U. S. army. By PETER S. MICHIE. With an introduction by Jas. Harrison Wilson. New York, Appleton, 1885. 28+511 p. 8°.

A treatise on practical astronomy, as applied to geodesy and navigation. By C. L. DOOLITTLE. New York, Wiley, 1885. 8°.

on the determination of azimuth follows it. The book closes with a very full and clear setting-forth of the subjects of precession, nutation, aberration, and proper-motion, with the formulæ for their application, and a set of tables most useful to the field-astronomer in reducing observations.

The most valuable and characteristic feature of the book is the excellent series of examples taken from actual modern practice, which accompany almost every method of using each instrument, and are fully discussed by the method of least-squares where its application is advantageous. There is throughout an endeavor to impress the importance of developing the degree of accuracy inherent in the observations, and the best methods of avoiding or eliminating systematic errors. The whole work bespeaks the thorough master of his subject. The warning as to parts of the normal-equations solution not checked by the proof-formulæ, the giving of the complete values of the auxiliaries in the formulæ for the weight-coefficients out to four unknown quantities, and many other points which would be overlooked by the mere book-maker or pure theorist, show that Professor Doolittle has thoroughly beaten the whole ground, and knows where the difficulties lie.

The typography of the book is excellent, and Professor Doolittle's known thoroughness gives us assurance that much less than the usual number of mistakes will be found in the printed text.

MEXICAN ETHNOLOGY.

THE magnificent ethnologic museum of the Trocadéro at Paris is one of the sights of that great capital which no scientific visitor should overlook. It is particularly rich in its American department, and the conservator of the museum, Dr. Hamy, has taken a pride not only in collecting in this department, but in studying his specimens and in publishing the results of his studies. As editor of the excellent *Revue d'ethnographie* he has always at his command a medium to give them promptly to the world. He has collected a number of these studies under the title, 'Decades Americanæ.' They treat of such topics as 'An anthropolith from Guadelupe,' 'Fishing industry in ancient times in the Californian Archipelago,' 'The Tzompantli,' 'An Aztec arrangement for supporting skulls,' 'The American solar wheel,' 'A pipe from King's Mound, Ashland,' etc. All these articles are

Mission scientifique au Mexique et dans l'Amérique Centrale. Anthropologie du Mexique. Par M. E.-T. HAMY. Paris, Imprimerie nationale, 1884. 4°.

Decades Americanæ. Mémoires d'archéologie et d'ethnographie Américaines. Par le Dr. E.-T. HAMY. Paris, 1884.

freely illustrated, and the specimens are described and discussed with clearness and from an astonishing width of special reading.

The 'Anthropology of Mexico' is a work of much more ambitious character. In this large and handsome quarto published by the French government, Dr. Hamy discusses the human remains that have been collected by French explorers in various portions of Mexico. He places them in relation with the oldest relics of the stone age from the same region, and reaches the conclusion that the implements, at any rate, point to a period and condition of human life exactly the same as existed in the United States and Europe during the epoch of unpolished stone. In the crania examined the principal characteristics were marked prognathism and brachycephalism. These traits the author thinks are especially pronounced in the skulls of the Otomis and Mazahuas. Besides the minute descriptions and abundant lithographic illustrations with which he enlightens his topic, he enters somewhat fully into the earliest legendary history of Mexican ethnography, attempting to define more closely the identity and relations of those mysterious people, the Quinamies, the Olmecs, and the Xicalancos. He wisely, however, treads with caution on this very uncertain ground.

ASTRONOMICAL NOTES.

Longitude signals between St. Louis and Mexico. — Professor H. S. Pritchett, director of the observatory of the Washington university at St. Louis, kindly communicates the results of a longitude campaign between his observatory and the Observatorio nacional de Mexico, Sr. A. Anguiano, director. A preliminary discussion gives $35^m\ 57^s.25$ as the difference of longitude, or $6^h\ 36^m\ 46^s.41$ W. of Greenwich as the resulting longitude of the transit-circle piers of the Mexican observatory. This differs $5^s.0$ from the old value determined by moon-culminations. The circuit was 2583 miles long, with five repeaters, and the armature time was quite constant, averaging $0^s.38$. The outfit of the Mexican national observatory includes a 15-inch equatorial by Grubb, and an 8-inch meridian-circle, and a 6-inch transit, both by Troughton and Simms. The *personnel* consists of the director (Sr. Anguiano) and five assistants.

Comet observations at Greenwich. — The somewhat unusual appearance in the *Astronomische nachrichten* (2688) of comet-observations communicated by the astronomer-royal attracts our attention, and we trust this is only the beginning of a continuous series. One point, we think, is worth noting. As communicated, they give the meas-

ured $\Delta\alpha$ and $\Delta\delta$, and then the *combined* correction for differential refraction and parallax. As every computer of the final orbit of a comet wishes to use his own corrected distances in applying the parallax, and as the distances used above are not stated, he must in this case re-compute both the differential refraction and the parallax-factors. It would certainly be better to publish the $\Delta\alpha$ and $\Delta\delta$ corrected for refraction, and the 'log $p\Delta$,' according to universal custom.

New or variable stars. — Mr. W. H. S. Monck, in the *Observatory*, 1885, 335, makes the suggestion that the new or temporary stars that occasionally appear may be due to swiftly-flying meteor streams in space, meeting a nebula or gaseous mass, either bright or dark, and suddenly heating a part to incandescence, as in the case of shooting stars striking our atmosphere.

Discovery of an asteroid. — A telegram from Professor Pickering announces the discovery on October 27 of a new asteroid, by Perrotin of the Nice observatory. Its position on October 27, at 7^h 12^m, Washington mean time, was: right ascension, 1^h 8^m 53^s; declination, +7° 8', with daily motions of —36" in right ascension, and —7' in declination. This is the eighth asteroid discovered this year, and the sixth discovered by Perrotin.

Mr. Chandler's Almucantar. — We recently noted (*Science*, vi. 239) Mr. Chandler's correction to the latitude of the Harvard college observatory from almucantar-observations. Since then he has unquestionably shown (*Astr. nachr.*, 2687) that this instrument is capable of detecting slight errors in the positions of even some of the '*hauptsterne*' of Auwers' system, and of furnishing valuable corrections to them from a comparatively limited number of observations. Mr. Chandler's promised memoir upon the construction, theory, and use of the almucantar will be awaited with unusual interest.

Death of General Baeyer. — Geodesy has lost its most illustrious representative in the death, at the advanced age of 91, of Dr. J. J. Baeyer, founder of the European *Gradmessung*, president of its central bureau and of the Royal Prussian geodetic institute. He died on the night of September 10–11.

NOTES AND NEWS.

ACCORDING to the report of Superintendent Wear, of the Yellowstone national park, the maintenance of a strict watch day and night has resulted in breaking up, in a measure, the wholesale slaughter of game; and the park is now full of game of all kinds, including about two hundred head of bison, large numbers of elk, and several

herds of antelope. By the new roads, access to the objects of interest is facilitated. It is recommended that the force of assistants be increased from ten to fifteen, as the present force is not large enough to prevent the commission of acts of vandalism. The travel in the park this summer has been much greater than ever before.

— President Porter has sent to the corporation his resignation of the presidency of Yale college, the resignation to take effect at Commencement, next June. He will, however, retain his position as Clark professor of moral philosophy.

— King Leopold of Belgium, it is reported, has already found the Kongo Free State a more expensive enterprise than he can carry on unaided. His recent visit to Wiesbaden was made, it is said, for the purpose of inducing some one of the German princes to assume the sovereignty of the Kongo country in his stead.

— R. T. Stupart, the Hudson Bay observer, who abandoned his station at Stupart Bay the day before the steamer Alert reached there, arrived in Halifax on Saturday, Oct. 31, on the steamer Miranda from St. John's, Newfoundland. Their voyage of twelve days in an open boat to Fort Chimo was exceedingly perilous.

— Supplementing the regular course of instruction at Sibley college, Cornell, a series of lectures on mechanical engineering will be delivered from time to time by members of a body of non-resident lecturers who have been chosen from among the most distinguished men of the profession. These gentlemen choose their own subjects, and times of lecture, and their own method of presentation of the subject selected. The director of the college announces that the following named gentlemen are engaged to lecture during the year 1885–86: Dr. E. D. Leavitt, jun., Dr. R. W. Raymond, Dr. C. E. Emory, Mr. Charles T. Porter, Mr. J. M. Allen, Mr. J. C. Hoadley.

— A petition to congress for a deed to San Miguel mountain—an excellent situation for an observatory, near San Diego—has been circulated by the San Diego society of natural history.

— The San Diego society of natural history has taken steps for the protection of the nearly extinct Punis Torreyana of San Diego county.

— The '*Lungen gymnastik*' of Th. Huperz is really a handbook on the care and development of the lungs, and the attendant and reflex advantages of such care. Though he says it is for the physician, yet its style and method are such that it may be most successfully used by the laity. The

structure and uses of the organs are just enough dwelt upon to make the subject clear. Besides the common ideas of the injuries of impure air, he tells of the evils of carpets, drapery, curtains, and upholstery as introducing bad air into our living apartments. He comes down heavily on the fear of slight draughts of air. If any adverse criticism is to be made, it is that the author does not make enough of the impure exhalations of the lungs and skin as injuring the air, laying the sin of air-poisoning too much at the door of carbonic acid. And the perils of carbonic oxide, as found in the products of combustion of water gas, are not dwelt upon.

— One of the best compends on its subject that has yet appeared is Edinger's ten lectures 'Ueber den bau der nervösen centralorgane,' just published at Leipzig. The subject is beset with very many difficulties, and there are many controverted points at every step, and many degrees of certainty about what is generally accepted. The author is, moreover, an original investigator, liable to give too great prominence to his own work. Despite all these difficulties, however, we have here without doubt the most lucid and the most judicious presentation of the subject of the finer internal anatomy of the nervous system yet made in so small space. The work contains 120 illustrations, many of them original, which add greatly to its value. We have long needed a concise presentation of this subject, which should include, as none of the larger and well known manuals do, the results of recent investigations, especially those of Meynert and Flehsig, to which full justice is here done. It is sure to prove of peculiar value to teachers. If another lecture could be added on the embryology of the normal brain, the value of the book would be increased.

— E. Wasmandorff has published (Virchow's and Holtzendorf's Sammlung wissenschaftlicher vorträge, ser. xx.) an exhaustive study of the various forms, in which sorrow for the loss of friends has manifested itself among all peoples, ancient and modern, civilized and savage. Fortified by a wealth of references to original sources of information, it constitutes a valuable contribution to anthropological science. It is impossible, within our limited space, to give more than a single example of the author's interesting generalizations. The ordinary colors of mourning garments are black and white. As is the European custom, black prevailed among the ancient Egyptians, Hebrews, Greeks, and Romans, and the native races of this continent. White is the color among the inhabitants of China, Japan, Oceanica and large portions of Asia; so also in parts of Greece and

anciently in Germany. Blue is the color in Arabia, and among the Turks and Egyptians, and in Catholic upper Germany it is prescribed by the church. Yellow was used by the ancient Celts and in some of the kingdoms of Asia.

— Several inquiries having been made of us relative to our statement on page 351, that an 'actual competitive examination' was required for admission into the Royal society of London, we print from *Nature* the following extract from Professor Chrystal's address before the British association, which seems to warrant what was said: "I think our great scientific societies — the Royal societies of London and Edinburgh, and the Royal Irish academy — might do more than they do at present to prevent this languishing of local science, which is so prejudicial to the growth of a scientific public. Besides their all-important publishing function, these bodies have for a considerable time back been constituted into a species of examining and degree-conferring bodies for grown-up men, that is to say, their membership has been conferred upon a principle of *exclusion*. Instead of any one being *admitted* who is willing to do his best, by paying his subscription or otherwise, to advance science, every one is *excluded* who does not come up to the standard of a certain examining body. So far is this carried in the case of the Royal society of London, that there is an actual competitive examination, on the result of which a certain number of successful candidates are annually chosen."

LETTERS TO THE EDITOR.

** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The care of pamphlets.

IN response to the demand which Mr. Goode makes in *Science* of Oct. 16, for descriptions of methods of caring for pamphlets, I describe my own method.

Each pamphlet is perforated at the back with holes to admit a cord. This is most conveniently done with a cutting punch, which makes a round and smooth hole, but it can be done with an awl. Cords are then passed through these holes, and any number of pamphlets may be bound together. Whenever it is desired to insert a new pamphlet, or to rearrange the old, the cords can be withdrawn and re-inserted. To facilitate re-arrangement, all holes are made at exactly the same height above the lower end of the pamphlet. If, then, all the pamphlets on the fauna of a country, for instance, have been bound together temporarily, and it is desired to rearrange them by zoölogical groups with the groups of other faunas, no difficulty in regard to the binding arises from the interchange. These holes are made, for octavos, at 2.5, 7.5, 16, and 21 cm. from the lower edge of the pamphlet; for duodecimos, at 2.5, 7.5, 11, and 16 cm.; for quartos, at 2.5, 7.5, 21, and 26 cm., etc.; so that pamphlets of any two or more

sizes can be bound together. Detailed reasons for this 'choice of distances may be found in my article entitled 'Standard covers for temporary binding,' in the *Library journal*, Jan., 1883, viii. 6, 7.

Covers for these pamphlets are punched with holes in the hinge or flap at the same distances, so that all covers fit all pamphlets. One or one hundred pamphlets can be inserted in a cover. The backs are made of heavy manila, as wide as the thickness of the book, with a margin folded over to be punched with holes, so that the back is laced between the pamphlets and the cover. By lacing the backs to the covers first, with thread or otherwise, and then inserting the pamphlets on a separate cord, the covers do not fall away when the binding cords are withdrawn. Of course, if desired, the backs can be glued to the covers.

One objection to Mr. Goode's method of having stubs permanently bound in the covers is, that no such re-arrangement can be made as may be desired. The backs are also of definite width, and cannot be enlarged as may be required for convenience. A pamphlet cover made as I recommend, if not tightly laced, will admit of laying in 50 per cent more pamphlets than are tied in, before it is necessary to re-bind.

If for any reason it is desired not to mutilate a pamphlet by making holes in it, it can be glued to a stub, or placed in an envelope glued to a stub, and the stub can be perforated.

Manila sheets can be prepared by the thousand, perforated with the standard holes, and newspaper scraps, etc., mounted upon them as desired, and these bound with the pamphlets. By pasting only on the recto, and marking the guide words or symbols on upper left-hand corner of verso, these words or symbols can be readily caught by the eye as the leaves are turned. When scraps occupy more than one sheet, the several sheets can be glued or tied together, so that they may afterward be handled as units. It will be found better in the end to put but one scrap on a sheet, so that the sheets may index themselves in the arrangement.

Next as to the arrangement and classification. The Dewey decimal classification and relative index is pronounced by many of the foremost librarians to be the greatest invention of the century in library economy. Its applicability ranges from that of assisting the school-boy to keep his notes to that of the president of the Royal astronomical society in classifying his library. Its simplicity is that of the Roman alphabet and the Arabic numerals; its comprehensiveness is that of assigning a subject number, for instance, to the 'spherical excess in the computation of a triangulation in geodetic work,' viz., 52,641; or separately indicating 'songs for male voices' (78,487), and 'songs for female voices' (78,488). Its index, in the new edition just issued, contains nearly 9,000 topics, and three tables allow these topics to be developed fully one hundred fold without loss of simplicity. One reference usually suffices to find the subject number of a topic, and by it a set of ten manuscript notes could be marked so that they need not be marked over to locate them in a library of ten thousand volumes, for the symbols would indicate not only what they were about, but where they were.

The use of this system can be seen in my own library and manuscripts, or in the catalogue I am making of the books and pamphlets in the entomo-

logical division of the U. S. department of agriculture. A description of the system is given in chapter xxviii. (pp. 623-648) of the special report on libraries published by the U. S. bureau of education in 1876.

I pay about one cent each for my pamphlet covers, octavo or quarto. They are serviceable, but not elegant, but they hardly show on the shelves.

B. PICKMAN MANN.

Star catalogues.

Would you please tell me where I could obtain a catalogue of the stars, and what would be the cheapest price I would have to pay?

H. C. I.

[If our correspondent would state a little more definitely the use for which the catalogue is desired, we should be glad to give the necessary information. A great number of star catalogues are published, no two just alike. The star list of the *American ephemeris* (to be obtained from the office of the *American ephemeris*, Washington, price \$1) would perhaps answer his purpose; while, for identifying the constellations, etc., Heis's *Atlas cælestis novus* would probably be found most useful; and Webb's 'Celestial objects,' giving a valuable list of colored stars, nebulae, clusters, etc., should be owned by every one that possesses an astronomical telescope. — ED.]

Calendar reform.

I notice in the supplement to No. 140 an article on reform in our calendar, by Mr. Paul. He refers to two changes in our method of reckoning time proposed by M. Jules Bonjean, one affecting the monthly calendar, the other the weekly.

Changes in the monthly calendar in past time have by no means been infrequent, but of such a capricious character as to result in great irregularities and an inconvenient arrangement. This is a fair subject for reform by way of simplification. But a change or break in the weekly cycle, for the sake of beginning every year with the same nominal day of the week, is quite another affair. Here we should touch upon questions of religious belief, which cannot be discussed in the columns of *Science*.

But the monthly calendar, being of human devising, is open to improvement. In regard to this, M. Bonjean's proposal and my own, in No. 108 (Feb. 27), agree in placing the intercalary day at the end of the year, and in making the months to consist alternately of 30 and 31 days. But he would begin the year by giving January 30 days and February 31, and thus proceed. This method would require a change in the number of days in 8 months out of the 12 in ordinary years. But by beginning the first half of the year with a month of 31 days, and the second half with one of 30 days, as in our present calendar, only 3 months would be changed in an ordinary year, including December; and in leap year only February and July. Thus convenience and symmetry would be secured with the least possible change.

EDWARD P. GRAY.

The swindling geologist.

A thief representing himself as Leo Lesquereux, jun., and also as one Strong, son of the geologist who was drowned in this state some years since, has been doing this part of the country of late, making way with geological reports, instruments, and specimens. He has been apprehended, and is now in the jail at

Elkhorn, Walworth county, Wis. His term will expire January 28, or within a day or two of that time. He is the same man who has carried on extensive swindling operations of a similar nature in the east.

Would it not be well to have him 'sent up' as many times as possible? I send you this information, hoping that it may seem wise to you to make his whereabouts known through your widely-circulated columns, and to encourage all interested to make it as warm as possible for this impostor. He very probably assumes other names than those I have given.

He is rather short, of light complexion, has a cynical expression, wears eye-glasses, talks with the greatest freedom of geologists, finding few worthy of recognition or favor. He looks to be thirty years, but represented himself here as forty-six. He told in many places about here, but did not say it here, that he was distributing specimens from the Smithsonian institution. He imposed upon many in that way. He is conversant with geology and geological work, and is certainly well posted on fossil plants.

Prof. N. H. Winchell, Minneapolis; Prof. W. F. Bundy, Whitewater, Wis.; Smith D. Atkins, Freeport, Ill.—are men who know his operations hereabout.

R. D. SALISBURY.

Beloit, Wis., Nov. 2.

Recent Proceedings of Societies.

Academy of natural sciences, Philadelphia.

Oct. 27. — Mr. John A. Ryder made some remarks on a new theory of the development of limbs and their muscles, which he had elaborated in the course of his embryological studies. These have led him to conclusions very similar to those defended by Prof. A. Dohrn and Dr. Paul Meyer, of Naples, though Mr. Ryder's results have been reached quite independently of the European investigators. The new views assume that great modifications of development have been induced by the presence of yolk and by intra-maternal changes. Somewhat modifying Haeckel's views as to the gastrula mouth, the latter is supposed to have become greatly elongated antero-posteriorly. The muscular segments or myotomes are supposed to have been developed from the edge of such a primitive mouth either directly or indirectly, thus giving rise to metameric segments enclosed by the larval skin or epiblast. The muscular segments then push out processes into pockets or folds of the latter to produce the various types of limbs. A large amount of detail was used in illustration and expansion of these views, in the course of which it was shown that the methods of comparative anatomy alone were no longer capable of dealing with many of the more important morphological problems without help from the science of embryology.—Dr. H. C. Wood gave the results of experiments on the effect of injecting gastric juice into the blood of animals. A plan having been devised for indicating graphically the changes in temperature, it was found that an active fever was quickly produced. It was observed that the heat of the body was inverse to the amount of heat given off, thus indicating that fever is a complex process, depending on the relations of heat production and heat dissipation. The action of the pepsin in such cases is not

clear, but it probably influences the nerve centres.—Mr. Lewis Woolman called attention to a very symmetrical boulder from the neighborhood of Thirty-first street and Haverford avenue, which was quite angular, although associated with rounded pebbles, and which contained on one side impressions of fossils. These were identified by Prof. Heilprin as *Orthis* and *Atrypa spinosa*. They were the first Devonian fossils to which his attention had been drawn in this connection.—Instantaneous microscopic photographs, by Mr. D. S. Holman, of *Amœbæ*, were exhibited. The views show, for the first time, the remarkable changes of form occurring in these organisms in the space of a few seconds.

Natural science association, Staten Island.

Oct. 10. — Mr. Hollick showed plants of the partridge berry (*Mitchella repens*, L.) bearing peculiar leafy berries, and made the following remarks upon the same: "Last autumn I mentioned finding some of these berries at Tottenville, with green leaves apparently growing out of the top or sides. On first sight these leaves appear like developments of the calyx lobes, but on a close inspection it is seen that the green leaves are growing from expanded petioles, which have tightly clasped the berries to a greater or less extent, and assumed their red color. The line between the berry and its enclosing envelope is not always distinct; but during the winter specimens which had been frozen were examined, and in them the line could be traced far more distinctly, owing to the berry being somewhat shrunken. These berries were kept in water for some time, and, although they and the stem leaves retained their colors perfectly, yet the adventitious leaves soon turned yellow and withered away. During the past summer and present autumn the locality was again searched for fresh specimens, and a number were discovered. In the newly-developed berries, as might be expected, the clasping petioles had not yet assumed the pure red color, many being of a duller red, and some distinctly streaked with green. After having been kept in water for a few days, however, the red became uniform throughout."—Mr. Congdon exhibited a spider covered with a fungoid growth, a species of the genus *Achlya*, and gave an account of its life history. This fungus is frequently found on insects which have fallen into the water, as in the case of this spider. It begins as a microscopic germ. A small thread next grows out from one side, bifurcating as it extends, until by repeated subdivisions it has formed a complete network of delicate threads. It reproduces itself asexually by means of the protoplasm in these threads, which breaks up into little balls, and when ripe is expelled into the water. They swim about for some time by means of ciliæ placed at either end, which finally settle down on the body of the nidus, and in a short time have grown into a plant like the parent.—Mr. W. T. Davis exhibited a deformed specimen of *Danaïd Archippus*, the monarch butterfly. On the 6th of August a full grown caterpillar was collected, and, after having transformed to a chrysalis, was removed from its point of suspension and a pin passed through it. This chrysalis was intended for a cabinet specimen, but it was noted as time went on that it gradually changed color, assuming the tints peculiar to the chrysalis before the butterfly emerges. On the 21st of August the butterfly hatched out, having developed about the

pin. This pin passes through the body at or near the second abdominal segment, being very close to the ventral surface.

Microscopical society, New York.

Oct. 2. —G. F. Kunz stated (*Jewellers' circular*) that a necklace was being made by Messrs. Tiffany & Co. of petrified eyes, and that three workmen who were engaged on the necklace had been made suddenly ill, and refused to resume work on such dangerous material. The so-called mummies' eyes are well known, and are, without question, the crystalline lenses of the eyes of a species of cuttlefish (squid). Some of the lenses from the eyes of these cuttlefish measure only 5 mm., but the majority of them are 12mm. in diameter, and some as much as 18mm. The color, really only the result of age, is a dark amber yellow, or golden bronze, externally on the convex side. In all cases they are nearly opaque, and have the appearance of an onion-skin or any other sack like concretion. On the flat side, however, the color is much lighter, and a little play of light is noticeable. The surface is rough, as if an exudation had hardened on it. The structure of the lenses is like that of a pearl,—an aggregation of successive enveloping layers, which are marked on the surface by sets of concentric rings. It is also plain, from these rings, that the lenses are sections, constituting only about one half of the original lenses of the fish, the intention undoubtedly being to produce additional luminous effect by this series of hemispherical reflectors. The crystalline lens of a human eye would not be so large as even the medium-sized lens exhibited, and is so exceedingly delicate that it can only be preserved at all by the greatest care. In many fishes, and especially the cuttlefish (squid), the lens of the eye contains so much solid matter that it will dry up in a short time, and with very little contraction, into a hard, transparent mass, which would probably be durable. On the contrary, Prof. Raimondi, the ethnologist of Peru, believes these eyes to be human, and Dr. Tschudi of Vienna is said to support him in this theory. The region where these mummy eyes are found is rainless, and the mummies were dried in a sitting posture on the salty sand or the nitre beds, often thousands of them at one place. This being the case, they must have been exposed to the public gaze, and the embalmers would naturally wish to make the appearance of the dead as attractive as possible. Hence it is probable that the cuttlefish eyes, which were inserted into the empty sockets, were cut into two nearly equal parts, in order to obtain greater lustre, and give a natural brightness to the eyes of their dead. The three workmen who were engaged in polishing these eyes were all affected soon after working on them. The sawing and polishing were done at different times, and in each case the same result followed, so that the workmen are confident that their illness was caused by the inhalation of dust during the sawing. The youngest, a boy of sixteen, was taken sick after working only a few hours. His illness consisted of headache, biliousness, and vomiting, and lasted for one day. Another workman, a strong, hearty Frenchman, about forty-five years of age, and weighing nearly 200 pounds, reported that he was taken sick with nausea, sick headache and vomiting, and noticed a disagreeable metallic taste in his mouth during his entire illness, which lasted four days. The other, a Ger-

man lapidary, about forty years of age, was affected shortly after working at the eyes with an eruption of pimples over his entire body, and when any of the affected parts were rubbed, a swelling immediately arose. This rash was perceptible for over a month. From the fact that these three cases occurred in one workshop, and soon after work was commenced on the eyes, the men very naturally reasoned that the eyes were the cause of their sickness, and expressed a desire not to resume work on them. In response to inquiry, Professor Baird writes that he never heard that poisonous qualities were inherent in the eyes. If they are really poisonous, it surely cannot be from any preparation used to preserve them, for no preservative was necessary, as would have been the case if they were human eyes. It has been observed, however, that, in this case, certain alkaloids may be generated by the decomposition of the organic constituents of the eyes. The United States survey chemists are examining the lenses, to see what alkaloids, if any, are present. As ornaments these eyes are truly beautiful when the exudation on the cut surface has been removed, and they are finely polished. They vary in color from a light yellowish amber tint to a dark yellow, yellowish brown, or rich amber brown, similar to that from Catania, Sicily. In some cases the colors are found in alternated bands, as in the Mexican fire opals from Queretara. Although the reflections lack the play of colors found in the opal, the tints are warmer and more pleasing. The lustre on the uncut rounded sides is pearly. With a proper gold mounting these eyes would give a very beautiful effect in jewelry, although moisture would be likely to injure the polish.

Calendar of Societies.

Biological society, Washington.

Oct. 31. — Col. Marshall McDonald, Fish-culture a necessity for the maintenance of the shad fishery; Mr. Wm. H. Dall, Deep-sea mollusks and the laws illustrated in their development; Mr. Richard Rathbun, Remarks on the Wood's Holl station of the U. S. fish commission; Mr. Romy Hitchcock, Notes on red snow, with exhibition of specimens.

Engineers' club, Philadelphia.

Oct. 17. — Mr. P. F. Brendlinger, A novel and cheap cement testing machine; Mr. John T. Boyd, The 'Coventry' locomotive boiler; Mr. Walter C. Brooke, Appliances for landing mine cars at the top of slope; Mr. A. Marichal, An instrument for at once describing arcs, of any radii from a few inches to infinity, and for determining the radii of arcs already drawn.

Academy of natural sciences, Philadelphia.

Oct. 27. — Carl H. Eigenman, A review of the American gasterostiedæ; Carl H. Eigenman and Morton W. Fordice, A catalogue of the fishes of Bean Blossom Creek, Monroe co., Indiana; B. W. Everman and Morton W. Fordice, List of fishes collected in Harvey and Cowley counties, Kansas; B. W. Everman and Seth E. Meek, A revision of the American species of the genus *Gerres*; Seth E. Meek and Robert Newland, A review of the American species of the genus *Scorpaena*.

SCIENCE.—SUPPLEMENT.

FRIDAY, NOVEMBER 6, 1885.

RECENT PROGRESS IN POLITICAL ECONOMY.

It has long been evident to close observers of current thought and discussion that the so-called science of political economy is in a state of transition. The old authorities have begun to lose their hold on general regard and esteem. Ricardo, Malthus, and Mill no longer hold the pre-eminent position once accorded to them. Until within a few years of Mill's death, the statement might have been truthfully made that nearly every prominent thinker in the field of economics in England, France, and Germany, was an adherent of the so-called orthodox school of political economy. Economics was regarded as one of the most exact and severe of sciences, and as having reached a most advanced stage of its development.

The reaction began in Germany early in the fifties by the rise of the historical school, and increased so rapidly that German thought was soon completely emancipated from the domination of English authority in this field. The movement was slower in England; but it had made such progress before Mill's death, that even Mill himself had begun to be influenced by it, and was convinced that many of his views were untenable. He openly confessed his conviction that one of his fundamental doctrines, that of the wage-fund theory, was false, and adopted a very different theorem in its place.

So steady and general was the defection in the ranks of the orthodox, and so vigorous were the attacks on the stronghold of the faithful, that the public soon lost all confidence in the scientific character of political economy. This was strikingly manifested, a few years ago, when a movement was started in the British association for the advancement of science, to abolish the economic section of that body on the ground that there was no such thing as a science of political economy. This movement was met, on that occasion, by the memorable address of Professor Ingram, which revealed, for the first time, how completely the later thinkers had broken with the old views. The growing influence of the writings of such men as Cliffe Leslie shows how ripe the time is for a new start in this field, while the recent publication of the work of the lamented Toynbee indicates the existence of a school of

thinkers in the very centre of Oxford and Cambridge, who are in hearty sympathy with the new movement.

The same tendency to break away from the old moorings is plainly seen among the younger men in this country. It is to be clearly discerned in the tone of newspaper writing done by those who have come under the influence of this new movement. It is evident at all the centres of learning where the modern scientific spirit has been allowed access to this field. It came plainly to light in the organization of the new American economic association formed at Saratoga in September last, where it was clear that the men interested in the enterprise believe that political economy is still in a rudimentary state, and that, if it is ever to attain to the rank of a universally acknowledged science, it must leave the purely abstract and *a priori* methods of the early economists, and have recourse to the same general methods of investigation which have achieved so much in modern natural science.

Perhaps the most striking evidence, however, of the untenableness of the old system, and the imperative necessity for a new, is to be found, not in the attacks of the opponents of 'orthodoxy' in the economic field, but in the present attitude of its defenders. For a time they took almost no notice of the defection from their ranks, or of the growing numbers of their opponents, or, if they did notice it, it was done in that supercilious way which is universally characteristic of conscious infallibility. But a great change has come over the spirit of their dreams. They are now finally aroused, and the result of their awakening is to be found in a series of attempts 'to restate the fundamental doctrines of the science in a less objectionable form.' As a matter of fact, when they get the doctrines fairly 'restated, so as to correspond more closely to the actual conditions of our modern industrial life,' the restatement is so different from the original theory that the latter is scarcely any longer to be recognized in it.

This is eminently true of the little work by Mr. Bagehot.¹ The author examines in the two essays of which the book consists, and which were originally published in the *Fortnightly review*, two of the postulates of the English orthodox school of economics, with the idea of restating them with such modifications as he thought they needed in

¹ *The postulates of English political economy.* By WALTER BAGEHOT. New York, Putnam, 1885. 8°.

order to bring them into harmony with the facts of modern society. The postulates selected are those referring to the transferability of labor and capital respectively.

After a short discussion of the reasons for the general neglect into which English political economy has of late fallen, in which he gives nearly all reasons except the right one, viz., that it is an outlived theory, the author proceeds to show that the Ricardian assumption of the easy and rapid transferability of labor and capital among various industries never has been true, and is not true now, though it may be true in the distant future. A more complete vindication of the justice of the attacks on Ricardo's system, so far as it is claimed to be a satisfactory explanation of our modern industrial economy, could scarcely be desired. Had Mr. Bagehot lived to finish the great work of which these essays were to form a part, it can scarcely be doubted that he would have followed out his premises to their legitimate conclusions, and finally have been found where he belonged,—among the opponents, instead of among the restaters, of 'orthodoxy.'

C. R.

TEMPERATURE OF THE MOON'S SURFACE.

PROFESSOR LANGLEY'S two most important discoveries—1°, that the greater part of the energy in the solar spectrum is way below the visible red; and, 2°, that our atmosphere is more and more transparent to radiant energy the greater its wavelength—promise to bear fruit in many directions. In his paper on the temperature of the surface of the moon,¹ one of their applications is shown in the complete upsetting of the long-cherished idea that the temperature of the moon's surface rises to 200° or 300° F. during the lunar day, and falls about as far below zero in the lunar night. First enunciated as a theory by Sir John Herschel, the only experimental evidence upon which it has rested has been the observations of lunar radiation by the present Earl of Rosse, to which Professor Langley takes no exception, so far as the experimental results are concerned, but from their interpretation by Lord Rosse, he entirely dissents. This interpretation rests upon the assumptions, 1°, that solar radiation is principally confined to luminous vibrations; 2°, that about 92 per cent of these are transmitted by glass; and, 3°, that only 1.6 per cent of the obscure rays are transmitted by glass. The first has already been shown

to be entirely wrong, and, when it is remembered that Professor Langley found over two-thirds of the total energy in the solar spectrum, from a glass prism, to lie below the visible red, nothing further need be said as to the non-conclusiveness of any deductions from the above assumptions.

Professor Langley's observations on Mt. Whitney lead him to the conclusion that, were it not for our atmosphere, the surface of the earth, even under continuous direct sunshine, would be at a temperature of only about 48° C. above that of surrounding space (whatever that may be), at any rate low enough to freeze every thing up solid, perhaps even the gases; and he concludes that the moon is in this condition unless it has an appreciably absorbing atmosphere, of which there are only some uncertain suggestions at present.

Attacking the problem entirely anew, he speaks of its importance as follows:—

"The amount of heat received from the moon, and the dependent question as to the temperature of the lunar surface, are subjects of greater interest to us than might at first appear. They are even ones in which we may be said to have a material concern, for, until we know the temperature which an airless planet would attain in the sun's rays, we can have no accurate knowledge of the extent to which the atmosphere of our own planet contributes to its heat, nor of some of the most important conditions of our own existence."

Professor Langley describes important improvements in the galvanometer used with his bolometer, so that with the combination of the two he is now able, when the needle is damped to a period of 10s., to make 1mm. on the scale correspond to a current of only 0.000,000,001,3 of an ampère, or indicate a difference of temperature of only 0°.000,016 C. As regards precision of measurement, the probable error of a single observation is only about 2 per cent of the total amount of lunar radiation, while in Lord Rosse's work the probable error of *the mean of a series of 10 observations* was 19 per cent, thus giving one of the former a weight equal to several hundred of the latter, to say nothing of its far greater freedom from constant errors.

With this apparatus, and with all the other refinements and precautions against error which invariably accompany all of Professor Langley's work, he has been making the following investigations:—

1°. Direct measurement of lunar heat compared with solar. 2°. Comparison of moon's heat with that of Leslie cube (hot water). 3°. Transmission of lunar heat by the earth's atmosphere. 4°. Comparative transmission of glass for lunar and

¹ Memoirs of the National academy of sciences, vol. iii, pt. i, 2d memoir. On the temperature of the surface of the moon. By S. P. LANGLEY. Washington, Government, 1885. 4°.

solar heat. 5°. Observations during a lunar eclipse. 6°. Formation of a lunar heat spectrum.

We can only summarize the results, and they are best given in his own words: "While we have found abundant evidence of heat from the moon, every method we have tried, or that has been tried by others, for determining the character of this heat, appears to us inconclusive; and, without questioning that the moon radiates heat earthward from its soil, we have not yet found any experimental means of discriminating with such certainty between this and the reflected heat that it is not open to misinterpretation. Whether we do so or not in the future will probably depend on our ability to measure by some process which will inform us directly of the wave-lengths of the heat observed."

Were this all, it would be a somewhat discouraging ending, but the best and most important part is a note added February, 1885, which we quote in full:—

"Since the above paragraph was written, we have succeeded in obtaining measures with rock-salt prisms and lenses in a lunar heat spectrum. These difficult measures must be repeated at many lunations before complete results can be obtained; but, considering their importance to the present subject, we think it best to state now in general terms, and with the reserve due to the necessity of future experiment, that they indicate two maxima in the heat curve,—one corresponding within the limits of errors of observation to the solar curve maximum; the second, indefinitely lower down in the spectrum, corresponding to a greater amount of heat at a lower temperature. Exactly what temperature this latter corresponds to, we have no present means of knowing. We have succeeded, however, in forming a measurable heat spectrum from the surface of a Leslie cube containing boiling water, and the maximum ordinate in the lunar heat curve appears to be below the maximum ordinate in the hot water curve. The inference from this is, of course, that the temperature of the lunar soil is, at any rate, below that of boiling water, and in an indefinite degree.

"We cannot close this note without calling attention to the remarkable fact that we here seem to have radiations from the moon of lower wave-length than from the sun, which implies an apparent contradiction to the almost universally accepted belief that the sun's emanations, like those from any heated solid body, include all low wave-lengths representing temperatures inferior to those certainly emitted."

Further comment is unnecessary. The novelty and importance of the above is self-evident.

H. M. PAUL.

ILLUSTRATIONS OF RECENT ITALIAN PSYCHOLOGY.

THE science of psychology is still somewhat in the position of the young man who has just passed his twenty-first birthday. While really entitled to all the rights and dignities belonging to any of the citizens of the republic of science, yet these privileges are accorded with somewhat of a reluctant spirit especially on the part of the older citizens, who seem rather startled at the notion of receiving, on terms of equality, so very youthful and so very presumptuous a candidate. But now that special professorships in this department have been instituted at several of our universities and colleges; now that the questions which it discusses find a hearing before appropriate sections of the great scientific associations (for it is scientific psychology alone that is meant); that special societies and journals are devoted to the encouragement of its progress; it may fairly be presumed that whatever of a protest to this reception still makes itself heard is only the echo of by-gone days.

While the greatest part of our experimental knowledge of mind is undoubtedly due to German writers and workers, France and Italy have also contributed much to raise the science to its present position. In France the *Revue philosophique*, of which M. Ribot, whose psychological works are well known to English readers, is the editor, pays special attention to the strictly scientific side of its domain. There has been founded, too, a society of physiological psychology, especially devoted to the consideration of experimental topics. In Italy the *Rivista sperimentale di freniatria*, edited by M. A. Tamburini, and the *Archivio di psichiatria*, etc., edited by M. Cesare Lombroso, devote much of their energies to another side of the subject. Both the writers just mentioned are deeply interested in the psychology of the criminal and other classes of defectives. The voluminous work of M. Lombroso (*Uomo delinquente*) is a standard in this line of research. The *Revue philosophique* for September enlarges the circle of readers of some of these researches, by presenting a summary of articles from the two Italian journals. In the hope of still further increasing the usefulness of these contributions to psychology, some account of them is given here.

M. Ferri has made a special study of the religious sentiment in the criminal class, and intends to publish a volume on this subject. He found, in a very large number of criminals examined, only a single one who did not believe in the existence of a God, and most of them belonged to the established church. Many of them are de-

voted to religion, tattooing themselves with religious symbols, asking for God's aid in their enterprises, and thoroughly sincere in their belief that confession absolves them from all responsibility. They are very superstitious; several were found who believed that they expiated their crime by dipping their fingers in the blood of the victim and sucking them, or by wearing the same shirt for a year.

A very excellent example of the connection between the various forms of mental and moral imbecility is shown in the case of a certain Salvatore Misdea, a soldier, whose crime was one of a peculiarly savage nature. He had a prejudice against all Italians who did not come from his own province of Calabria, and imagined that a certain officer had selected his fellow-countryman for punishment just because the latter was a Calabrian. He attacks the corporal, but another soldier, Cordara, interferes. He threatens to chop Cordara's head off that night, but soon everything is calm again. Suddenly a shot is heard and a soldier falls. Misdea enters with a gun, and fires into the crowd right and left. Many try to escape, but he pursues them, and kills the corporal and five or six other soldiers before the gun is wrested from his hands. In prison he was carefully examined by M. Lombroso and Bianchi. They find him to be a crafty, suspicious fellow, with a good deal of pride in his criminal powers. His head was deformed and asymmetrical; the forehead low and poorly shaped, narrow in the temporal region and large above. The right half of the head is more developed than the left; the reverse being the normal condition. Besides, he has epileptic tendencies. His family presents a line of abnormal persons, whose abnormality shows itself in insanity, idiocy, criminality, and general looseness of character. (1.) His grandfather was weak-minded. (2.) Of four uncles, two were imbeciles, a third eccentric, and a fourth killed a friend in a broil; while Misdea's father wasted a fortune on drink, women, and gambling, and his mother was an hysterical woman, who had one brother a brigand and another a sneak-thief. (3.) Of four cousins, two were imbeciles, a third idiotic, and the other insane. (4.) Of four brothers, one was healthy; two were drunkards, one at the same time epileptic; and the other was a violent character. (5.) A nephew also showed bad traits. In spite of all the evidence pointing to his irresponsibility he was condemned to be shot.

This case strongly reminds one of the celebrated criminal family of the 'Jukes' in New York state. There, too, the members of this monstrous family were not all afflicted with the same kind of disease, but weak-mindedness, pauperism, obscenity,

thievishness, and burglary showed themselves in different branches of the family. This inter-relation of moral and mental insanity, especially in their hereditary forms, has recently been attracting much attention. Dr. Maudsley has noted the great prevalence of moral failings in epileptics and imbeciles. Kraft-Ebbing, a German alienist, corroborates these observations; and M. Lombroso has now attempted to describe some bodily peculiarities common to many of these defective classes. He finds that in moral insanity as in epilepsy the stature and weight are often 13 per cent superior to the normal mean. There is generally, too, an asymmetry of the cranium and other parts. So, too, in face characteristics, epileptics show certain peculiarities which are also found in persons defective from birth. The ears are rounded, the cheek-bones prominent, the forehead wrinkled, the beard wanting, the jawbones exaggerated, the face asymmetrical, the forehead low and with a hunted expression among the men. Most of these characteristics are evident in the women as well, who frequently have a masculine expression. Obtuse sensibility and eye troubles are common among them. But the chief points of contact will always be their psychology, and for this one must consult the larger works of Lombroso and others.

The study of the bodily or anthropometric peculiarities of these defective classes is getting to be a very favorite line of work. Quite an original contribution to this subject is the attempt of Messrs. Lombroso and Couston to detect the effect of different states of the emotion on the pulse beat. They took the tracing of the sphygmograph in sad and gay moods. They excited the amorous passion, or showed a piece of gold, or a glass of wine, or paid the person a high compliment. The sexual passion and the glass of wine modified the course of the pulse, the money did so still more, and vanity the most. In short, criminals are a very vain class of beings.

The question of bodily asymmetry has been frequently referred to, and is generally recognized as an important symptom not only in the head measurement, but also in all the properties common to the two sides of the body. M. Lombroso has recently measured the local sensibility¹ of the skin on the two sides of the body in the sane, insane, blind, and deaf mutes. In normal persons the sensibility on the right side is 6 per cent better than on the left. In 100 persons there is an equal sensibility on the two sides in 44; left

¹ This was done in the usual manner. A pair of compass points are applied to a definite region and moved so far apart until the subject can just discriminate that two points are applied (and not one).

superior, 26; right superior, 29. In criminals, however, the left side is 11 per cent more sensitive than the right; and their sensibility is only 83 per cent of the normal; *i. e.* their sensibility is more obtuse, and the normal relations on the two sides are reversed. In 100 criminals the sensibility is equal bi-laterally in 54; left superior in 27; right superior, 18. One hundred and four insane patients were examined, 43 per cent of whom were more sensitive on the right, 33 per cent on the left side, and 24 per cent were equally sensitive on the two sides. As left-sidedness of this kind becomes more frequent, the difference between the two sides of the body becomes greater. This phenomenon the author calls 'laterality,' and recognizes as a true pathological symptom. In the blind, as in normal people, the right side is the more sensitive, and is as much as 13.5 per cent superior to the left. But their absolute sensibility is 96 per cent of the normal,¹ *i. e.*, slightly less than that of seeing persons. The male blind are more sensitive on the left side, the females on the right. Their 'laterality' and prevalence of left-sidedness allies them to abnormal classes. In deaf mutes the left sensibility is 15.5 per cent better than the right, and their absolute sensibility is like that of the blind, 4 per cent inferior to the normal. Left-sidedness, too, is prevalent.

J. J.

COMPOSITION OF THE WHEAT GRAIN.

THE various grades of wheat flour differ from each other, chiefly as regards the admixture of the outer coats of the grain and of the germ found in the pulverized endosperm which constitutes the bulk of the flour. The problem which M. Girard in his recent book² proposed to himself was to separate the grain, not into flour and bran, but into the several tissues of which the microscope shows it to be composed, to determine the proportion of each contained in the grain, to analyze each, and, finally, to determine from these and other data the alimentary value of each tissue and the advisability of allowing it to enter into the finished flour. By very ingenious methods, and the expenditure of much time and patience, he was able to separate, first, the coats of the grain from the endosperm, and, second, the several tissues of the seed coats from each other. The results of this laborious investigation are very interesting,

¹ This conclusion is contrary to the prevailing opinion. Moreover, the careful experiments of Czermak on blind boys showed very clearly that their sensibility was better than that of seeing persons. It should also be noted that the left side is frequently referred to as the more sensitive.

² *Composition chimique et valeur alimentaire des diverses parties du grain de froment.* Par M. AIMÉ GIRARD. Paris, Gauthier-Villars, 1884. 67 p., 3 pl. 8°.

and enable us to form a much more accurate notion of the quantitative distribution of nitrogenous matters, ash, woody fibre and fat among these tissues than was possible before. At the same time it cannot be said that, aside from this, they constitute any very material addition to our knowledge. They show that the 'aleurone layer' is rich in nitrogenous matters, and contains very nearly all of the nutritive substances found in the seed coats, but this was well enough known before.

Of more general interest are his investigations of the nutritive value of the several seed coats, and of their influence upon the quality of bread; but here, unfortunately, a prejudice becomes apparent which detracts seriously from the value of the investigations. The author entitles this section of his book '*Experiments upon the non-digestibility by man of the envelope of the wheat grain*' (the italics are ours), and he allows this prepossession to lead him into some serious errors in interpreting his results. His digestion experiment (but one was made) was executed upon himself, and, according to his interpretation, showed that but an insignificant proportion of the total dry matter or of the proteine of the envelope was digested. Before the experiment, however, he extracted his materials with water. The amount of matter thus extracted is stated, but it is not counted as digestible, as it evidently should be, because, as the author himself says, "it is evident that they (the extracted matters) would be dissolved in the digestive apparatus."

Correcting this error, and also a gross error in the method of calculation employed for the proteine, we find that there was really digested 22.8 per cent of the dry matter and 35 per cent of the proteine of the envelope, or that it contained 22.8 per cent of total digestible matter, including 6.5 per cent of digestible proteine. Girard's figures are 6.77 per cent of total digestible matter and 0.73 per cent of digestible proteine!

Rubner, in some recent investigations¹ obtained still higher figures, viz., 31.3 per cent of the dry matter, 61.1 per cent of the proteine, and 26.6 per cent of the non-nitrogenous matters; but his figures were obtained by a rather complicated calculation, and refer rather to commercial bran than to the clean seed coats of Girard's experiments. There is no sort of doubt that a not inconsiderable proportion of the seed coats is digestible by man, but, as Girard emphasizes, when calculated upon the whole grain the proportion thus utilized is small, while the quality of the bread is impaired. This is particularly the case with raised bread. According to Mège-Mouriès

¹ Jahresbericht über thier-chemie, xiii, 384.

(quoted by Girard), the envelope contains a soluble ferment resembling diastase, which, during the raising process, at the same time converts starch into sugar and diminishes the elasticity of the gluten, thereby tending to make the bread heavy, while it also imparts a brown color to the bread. Bread made with baking-powder would naturally escape these effects to a large extent.

It is certain that wholesome, palatable bread can be made from whole wheat flour, and, for dietetic reasons, many may prefer it. From an economic point of view, however, it can hardly claim any great advantages, so long as nearly every one can command a mixed diet, and the bran can be profitably utilized as cattle food.

THE ENGLISH SPARROW.

THE question of the policy to be pursued toward this bird is fast becoming one of importance; and in many parts of the country stringent measures of extermination are urged by the indignant citizens. A committee of the American ornithologists' union recommended as the result of their inquiries,—

1°. That sheltering or otherwise fostering the sparrow by the public be discouraged, and that its introduction artificially into new localities, and its sale for such purposes, be forbidden by law.

2°. That all existing laws protecting the sparrow be repealed, and that bounties be offered for its destruction.

The states at present protecting this species are Maine, New Hampshire, Vermont, Rhode Island, New York, New Jersey, and Ohio. There are also protective laws in the District of Columbia and Canada. The Massachusetts law has been repealed and specially exempts the English sparrow from protection. The protective law has also been repealed in Michigan.

The earliest known date of importation of the bird is 1858, when Mr. Thomas A. Deblois liberated a few in Portland, Me. These disappeared shortly afterward, and were not successfully replaced until 1875. In 1858 sparrows were liberated at Peacedale, R.I., by Mr. Joseph P. Hazard. They were first introduced into Central park, New York city, in the year 1860. In 1864 twelve birds were turned loose in Madison square, New York city. In 1868 the species was first introduced into Boston common; in 1869, in the parks of Philadelphia; and a little later it became resident at Indianapolis, Ind. In a period of about ten years the sparrows spread through New England and the middle states, and many of the western states, without artificial assistance. In the southern and the western states, beyond the Mississippi River, the

bird has not been observed. In Canada it has become generally distributed over the southern sections of Quebec and Ontario, and in 1884 several flocks invaded New Brunswick.

The bird is evidently spreading itself with extreme rapidity, which should be expected from a bird that hatches from three to four broods of four each in a single season.

In regard to the food of the sparrow, little seems to be settled except that it prefers vegetable food to animal, but will eat insects if driven to it. It is capable of doing great injury to grain, and is a great pest to fruit-raisers. I have seen flocks of them in cherry-trees doing far more mischief than the robin, and I have seen them in early spring nip off the young buds of peach-trees without any apparent reason, other than a desire not to be idle. Seeing that they did not appear to eat the buds, I killed two to see their reason for this destruction. I found nothing in their stomachs except crumbs that had been fed them that morning.

The bird has little to recommend it, is noisy, dirty, and disagreeable both to man and to other birds; and there is every reason why we should do in this country as it has been found necessary to do in others,—enact laws looking to their extermination.

RALPH S. TARR.

THE EFFECT OF THE SETTLEMENT OF NORTH AMERICA UPON ITS WILD ANIMALS.¹

THE common deer was abundant from Florida to Canada, throughout the eastern half of the United States, when Europeans first settled in this part of North America. It is now restricted to the sparsely-settled forested portions of this area, and is rapidly decreasing in numbers. The 'elk,' or wapite, ranged throughout temperate North America as far east as the Blue Ridge. For many years it has been wholly extirpated east of the Great Plains and in the Rocky Mountains, and in the far west generally is rapidly approaching extinction. The moose and the caribou have been driven northward in New England and southern Canada to still unsettled forest regions; while the bison, formerly ranging in considerable herds eastward to the Alleghanies, and occupying the Great Plains in countless numbers, is now practically extirpated; a few small bands, remotely scattered, and numbering a few dozen individuals each, constituting the insignificant remnant of the millions that, less than twenty years ago, covered the Plains, from Texas to the Saskatchewan. The pronghorn and

¹ Condensed from an article by Ernest Ingersoll, in Bull. Amer. geogr. soc., 1885, No. 1.

the black-tailed deer have suffered great restriction in area of habitat, and have greatly decreased in numbers. The mountain sheep and mountain goat, delighting in the rocky fastnesses of alpine summits, well-nigh inaccessible to man, still bid defiance to human foes, although the former has been driven from much of its former range. At the present rate of destruction, only a remnant will soon remain of any of the ruminant tribe, even in the comparatively unsettled west, though formerly they overspread the greater part of the continent.

The larger carnivorous mammals—as the bears, the wolf, the coyote, the lynxes, and the panther, formerly so abundant throughout the parts of the country they respectively inhabited as to be at its first settlement obnoxious, and a serious detriment to the farmer and stock-raiser—are now practically exterminated east of the Rocky Mountains, and thence westward are rare in comparison to their former abundance. This is especially true of the wolves, the coyotes, and the panthers; the bears and the lynxes still maintain a foothold in the partially wilderness areas of the east.

The fur-bearing animals—as, notably, the beaver (formerly a nearly universal occupant of the continent), the otter, the sable, and the mink—have greatly decreased in numbers, all but the latter having been long nearly extirpated throughout all the more settled portions of the east. The sable, a northern species, never ranged over a very large part of the United States, but the others were spread southward to the Gulf. The squirrels, at times a scourge to the frontier farmer through their abundance, linger still in small numbers; while the smaller vermin of the fields have doubtless suffered but slight decrease in numbers.

The birds are variously affected, in accordance with their food and haunts. The larger forest-haunting species—as the birds of prey, the woodpeckers, and some of the grouse—have followed the forests in their downfall; the turkey, the prairie-hen, and the aquatic game birds—as the ducks, geese, and a great variety of shore birds—have in places been extirpated, and, in general, are few in comparison to their numbers a century ago. The song-birds have doubtless held their own, and in not a few instances have certainly increased; the agricultural development of the country being, on the whole, favorable to their welfare, although they suffer at the hands of nest-robbing boys, and children of larger growth anxious to kill something, however slender the pretext. The graceful terns, or 'sea-swallows,' and the herons, especially the beautifully-plumed egrets, have fallen a prey to fashion and the 'hat trade' to such an extent, that where, fifty years ago, the terns fairly swarmed

along our Atlantic coast, they are now mainly conspicuous by their absence.

Batrachian and reptilian life has also greatly diminished; the former through the draining of ponds and marshes in the reclamation of waste lands, the latter through the almost universal inborn hatred of snakes.

The depletion of our inland streams and lakes and the larger rivers, of fish, is simply notorious, extending even to the marine species that enter the rivers merely to spawn. Nor has marine life fared better, as witness the decline of the lobster fisheries, the actual and very early extirpation of the oyster along our northern coasts, and the exhaustion of once famous clam-flats.

Much of this destruction of animal life was simply inevitable, since wild large game cannot exist in a densely-populated district. But extirpation has been in many cases needlessly hastened, as witness the preservation of deer by legislative enactments, in regions where they would otherwise have long since ceased to exist. The course of the pioneer has ever been marked by slaughter of animal life, too often recklessly, even for the mere sport of killing, and not merely from necessity or with utilitarian intent. Hundreds of thousands, probably millions, of bisons have been killed merely for their hides, and at seasons when they were nearly worthless, and their carcasses left to rot where they fell, and many thousands more merely for the sport of slaughter; while the different species of the deer tribe have suffered similarly, in less degree, consequent only upon their smaller numbers and greater difficulty of capture.

ADMIRAL BARON FERDINAND VON WRANGELL.

FERDINAND VON WRANGELL was born near Werro in Liefland, December 29, 1794. His early years were passed on his ancestral estate, where his education in manly sports and the schooling of his time was carried on by a family tutor. At the age of ten he lost his parents, who died within a few months of one another. He entered not long afterward the school of naval cadets at St. Petersburg, with his cousin Wilhelm, and was graduated in 1815 with the highest honors. He was appointed to the post of Reval, where he was associated with his cousin and von Anjou, an intimate friend, later his companion in Siberian travel. Hearing that a Russian vessel was to sail for a voyage around the world in command of Captain Golofnin in 1815, he secured an appointment and formed one of the party on the naval sloop Kamchatka, which included the young and

afterward celebrated Lütke. The vessel sailed for Russian-America in 1817, and completed her voyage in two years, when he was promoted to a lieutenantcy, after which, through the influence of Golofnin, he was appointed leader of the expedition for the exploration of the east Siberian coast and the lands believed to lie to the north from it. For this journey, which has become classical, he prepared himself by special study at Dorpat and St. Petersburg. He went out in 1820 and returned to St. Petersburg in 1824. In 1825 he took the brig *Krotky* on a voyage to Sitka and return, after which he was appointed to the command of a frigate, and in 1829 to be governor of the Russian colonies in America. He married the Baroness Elisabeth Rossillon, and the young pair started for his new post by the overland route across the whole breadth of Siberia. The journey, severe at the present day, was an extraordinary one for that time, and took a year and a half, during which time a daughter was born to them. Arrived at his post, Wrangell distinguished himself by the reforms he introduced into the colonial administration, and the wealth of scientific material which he gathered for students of geography and ethnology. They returned via Mexico and the United States in 1836. He was made a director of the Russian-American company, and advanced in the government to the post of director of naval construction and conservator of the imperial forests. In 1852 he lost his faithful wife. During the Crimean war he was made director of the hydrographic department, and in 1862 retired from active service. His life thereafter was passed in the bosom of his family, either in his old home or in Italy, where he remained several years. He was made associate of the Institute of France as successor to De Candolle, and his latter days were passed in the study of art, science, and the promotion of the Lutheran communion, of which he was a devoted member. On the 25th of May, 1870, he died, his friend Lütke surviving him eleven years. His services to science do not need to be recounted, his character was pure and elevated, and his executive ability remarkable. The sketch of his useful and honorable life¹ from which the above facts have been gathered, has been prepared as an introduction to a new edition of his 'Journey to the polar sea,' by his daughter, Lisa von Engelhardt. This publication, indispensable to all students of arctic matters, contains an excellent portrait and a new map of the region explored. It is well printed in Roman type, but contains no index. We note as a singularity that,

notwithstanding Baron Wrangell expressly authorized his associates, Baer and Helmersen, to print his name with the final consonant doubled, in this publication it is found without the final *l*.

A SEARCH FOR THE GIGANTIC BIRD OF MADAGASCAR.

GRANDIDIER has communicated to the Academy of sciences an interesting account of his search for remains of the gigantic bird of Madagascar, the *Æpyornis*, supposed to be the original from which the fabled roc of the 'Arabian nights' was derived. The hope that the bird itself might still survive, according to Grandidier, is without foundation. A vast area of the interior south of Lat. 20° S., heretofore hardly visited, now proves to be an arid plateau with sparse desert vegetation, suitable perhaps for ostrich-like birds, but where they could hardly exist without being observed even by the scanty population of these wastes. These natives have neither knowledge nor traditions of any such creature, according to our author. Remains, chiefly of the eggs, have hitherto been found only between Cape St. Marie and Machikora on the southern coast, at Mananzari, Port Leven and St. Marie Island. The coast is bordered by immense sand dunes, only a few yards from the sea, which are constantly advancing in a southwesterly direction. The complete eggs have been found only where rain, flooding the ravines, has suddenly washed away large quantities of sand. It is probable that the bird covered its eggs in the warm sand like an ostrich, and that those found whole are such as failed to hatch. They are naturally rare, but fragments of the egg-shell are not uncommon and occur chiefly where the sand is sifted by the wind. On the dry plateau none were found. With the pieces of egg-shell, were found several species of *Bulimus*, *Helix* and *Cyclostoma*, one of which, *Bulimus favanneus* Fér., still retains part of its color marks, and is found living in some parts of Madagascar at the present day. The dunes appear to be formed largely of shell sand mixed with grains of quartz, and occasional concretionary balls of lime. The traveller was not fortunate enough to find any bones. He thinks the *Æpyornis*, like the moa of New Zealand, though now entirely extinct, existed during the present era, but was probably exterminated very soon after the advent of man in the region it inhabited.

— Mr. Latchford of Ottawa recently discovered at Quebec, *Helix cantiana* Montague, hitherto unrecorded from America. It is doubtless an importation, but was abundant under the south wall of the citadel, showing that, like many other immigrants, it has found a congenial home.

¹ *Ferdinand von Wrangel und seine reise längs der nordküste von Sibirien und auf dem eismeere.* Von L. v. ENGELHARDT. Leipzig, Duncker & Humblot, 1885.